PIER Energy-Related Environmental Research
Environmental Impacts of Energy Generation, Distribution and Use

Development of an Energy Module for the I-PLACE^{3}S Planning Tool with EcoInteractive

Contract #: 500-04-021
Contractor: EcoInteractive
Contract Amount: $405,254
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Commission Contract Manager: Gina Barkalow

The Issue

California uses over 250 billion kilowatthours (kWh)[1] of electricity a year, and new electric utility infrastructure is needed to meet increasing demand and to fulfill the state's target of 20% renewable electricity production by 2017. At the same time, the state's population and its urban landscape is growing. The amount of urbanized land in California's 36 most urbanized counties is estimated to increase more than 25% in the next two decades and more than double by 2100.[2]

Despite these facts, energy supply and efficiency options are seldom integrated into local government land use decision-making processes—and unless local governments' energy options are considered early in the policy development process, the economic, reliability, and environmental benefits of such options are minimized or lost. A Public Policy Institute of California working paper[3] recommended that this issue could be resolved if California's Council of Governments (COG) coordinated local government electricity planning. However, the regional groups responsible for transportation and land-use planning do not have readily available scientific tools to analyze energy concerns as part of the land-use planning process.

In the 1990s, the California Energy Commission developed and supported a geographic information systems (GIS) land-use planning software called *PLACE^{3}S*, to help increase "smart growth" decisions throughout California. Based on its success, the Commission developed a prototype PLACE^{3}S energy module that helps users calculate energy demand and best-fit options for distributed generation (DG) for any geographic area in California. However, the PLACE^{3}S desktop energy module could not handle the needed data volume, speeds, and complexity necessary for sophisticated assessments and real-time response, so the Commission supported the development of an Internet-based version—I-PLACE^{3}S—which uses various technologies to increase its accuracy and data volume capabilities, as well as to reduce calculation times.

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[1] California Energy Commission. California Electricity Consumption by Sector. www.energy.ca.gov/electricity/consumption_by_sector.html.

[2] Landis, J., and M. Reilly. 2003. *How Will We Grow? Baseline Projections of the Growth of California's Urban Footprint through the Year 2100.* UC Institute for Urban and Regional Development.

[3] Burke, James E.. *The Challenge to Involve Local Government in California Electricity Policy*. June 2003. Public Policy Institute of California. 106 pages.

Project Description

In this project, PIER is funding work by EcoInteractive to integrate energy planning capacity into I-PLACE^{3}S (which is being used by COGs in California) so that local government planners and decision makers across a region will be able to view the outcomes of energy analyses alongside established key planning data such as housing costs, vehicle miles traveled, infrastructure cost assessments, and air emissions data. EcoInteractive is working directly with planning staff and expert subcontractors to discuss calculations, implement complex algorithms, test and validate the energy module, and refine this new functionality.

The goal of this project is to develop an Internet-based I-PLACE^{3}S energy module that uses the concepts, data flow, and algorithms of the desktop prototype energy model. In addition, the project is:

- refining user needs for the I-PLACE^{3}S energy module,
- developing user-friendly "point and click" interfaces that simplify user interactions,
- enabling the module to calculate energy efficiency and distributed generation technology options in minutes (or seconds),
- providing the module with the ability to calculate energy demand and consumption at a single application/building level and at a global/community level,
- making it possible to analyze DG options, including: wind, photovoltaics, combined heat and power engines,
- testing the validity of the energy calculations implemented in the new I-PLACE$_3$S version of the energy module, and
- testing the use of an I-PLACE^{3}S energy module with two or three local governments within the Sacramento region.

PIER Program Objectives and Anticipated Benefits for California

This project offers numerous benefits and meets the following PIER program objectives:

- **Providing reliable electricity.** This work will provide a tool that enables local governments acting through COGs to better analyze regional decisions about energy production and use. As a result, energy decisions will address a broader range of regional considerations, and more realistically account for energy use and production within a region. Such assessments will include consideration of more localized DG systems, which could increase electricity system reliability.
- **Providing environmentally sound electricity.** By incorporating electricity needs with land use projections, the energy module will enable planners to compare and quantify the energy and associated environmental impacts of various land use decisions.

Final Report

PIER-EA staff intend to post the final report on the Energy Commission website in summer 2006 and will list the website link here.

Contact

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